



School of
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The Effect of Oral Rehydration Solutions (Sports Drinks) on Strength, Speed, and Endurance: A Field Study

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INTRODUCTION

- Dehydration has a major impact on cardiovascular performance, at a 2% decline in body mass(4)
- To prevent dehydration, the American College of Sports Medicine recommends a 6% carbohydrate/electrolyte beverage when exercising in a hyperthermic environment (4)
- When comparing carbohydrate sources, combinations of glucose (1) and fructose or glucose and sucrose (2) had higher oxidation
- We tested CeraSport® which contains rice as its carbohydrate base and a lower concentration level, indicating better absorption rate for an isocaloric amount (3)

METHODS

Subjects, Instrumentation and Measurements

- 13 healthy adult males with a Vo2Max in the 70th percentile or higher and a body fat index of 15% or lower

Drinks

- CeraSport: A rice-based sports drink with carbohydrates and electrolytes
- Gatorade: A commercially available sports drink with sucrose and electrolytes
- Ultima: A commercially available sports drinks with electrolytes but no carbohydrates

Protocol

- Participants weighed, temperature taken, and given a standardized breakfast upon arrival
- Participants walk 5.25 miles carrying a 40-pound pack
- Participants weighed after completing walk in dry shorts
- Participants completed 3 sets up push-ups to exhaustion, 3 sets of a 40-yard dash, and a mile run
- After protocol, participants weighed, temperature taken, and a survey completed
- Every 15 minutes from arrival to departure, participants drank 250ml of their treatment
- Treatments change each week for a total of three weeks

Measurements Taken

- Maximum and Total pushups
- Best 40-yard dash time
- Time to complete 5.25-mile walk
- Weight and Temperature change
- Urine output (self-reported) and fluid balance
- Wet Bulb Globe Thermometer Temperature

Statistical Analysis

- One factor ANOVA in Microsoft Excel with p-value of 0.05
- Averages and Standard Deviations presented

RESULTS

Exercise Between Treatment Groups

Exercise	Average CeraSport®	Average Gatorade®	Average Ultima®	P-Value
5 Mile Walk (min)	83.65 (±4.97)	85.44 (±4.33)	85.14 (4.44)	0.67
1 Mile Run (min)	6.91 (± 1.09)	6.87 (±0.94)	7.07 (± 1.03)	0.10
40-yard dash (sec)	5.48 (±0.43)	5.28 (±0.40)	5.39(±0.44)	0.81
Push-Up (peak)	56.56(±9.44)	54.11 (±13.71)	51.44 (±13.51)	0.07
Push-up (total)	132 (±31.50)	129 (±38.49)	123 (±23.35)	0.77

Survey Results Between Treatment Groups

Question	Average CeraSport®	Average Gatorade®	Average Ultima®	P-Value
Question A	3.50 (±1.00)	3.75 (±1.00)	3.25(±0.97)	0.86
Question B	3.75 (±0.43)	3.50 (±0.71)	3.25 (±0.66)	0.33
Question C	4.125 (±0.33)	3.75 (±0.66)	3.63 (±0.48)	0.19
Question D	3.75 (± 0.43)	3.50 (±0.87)	2.86 (±0.93)	0.12

Question	Average CeraSport®	Average Gatorade®	Average Ultima®
I enjoyed the taste of my drink (A)	Agree	Agree	Neither agree or disagree
My drink was refreshing (B)	Agree	Agree	Neither agree or disagree
My drink gave me energy (C)	Agree	Agree	Agree
My drink was better than water (D)	Agree	Agree	Neither agree or disagree

Measurements Between Treatment Groups

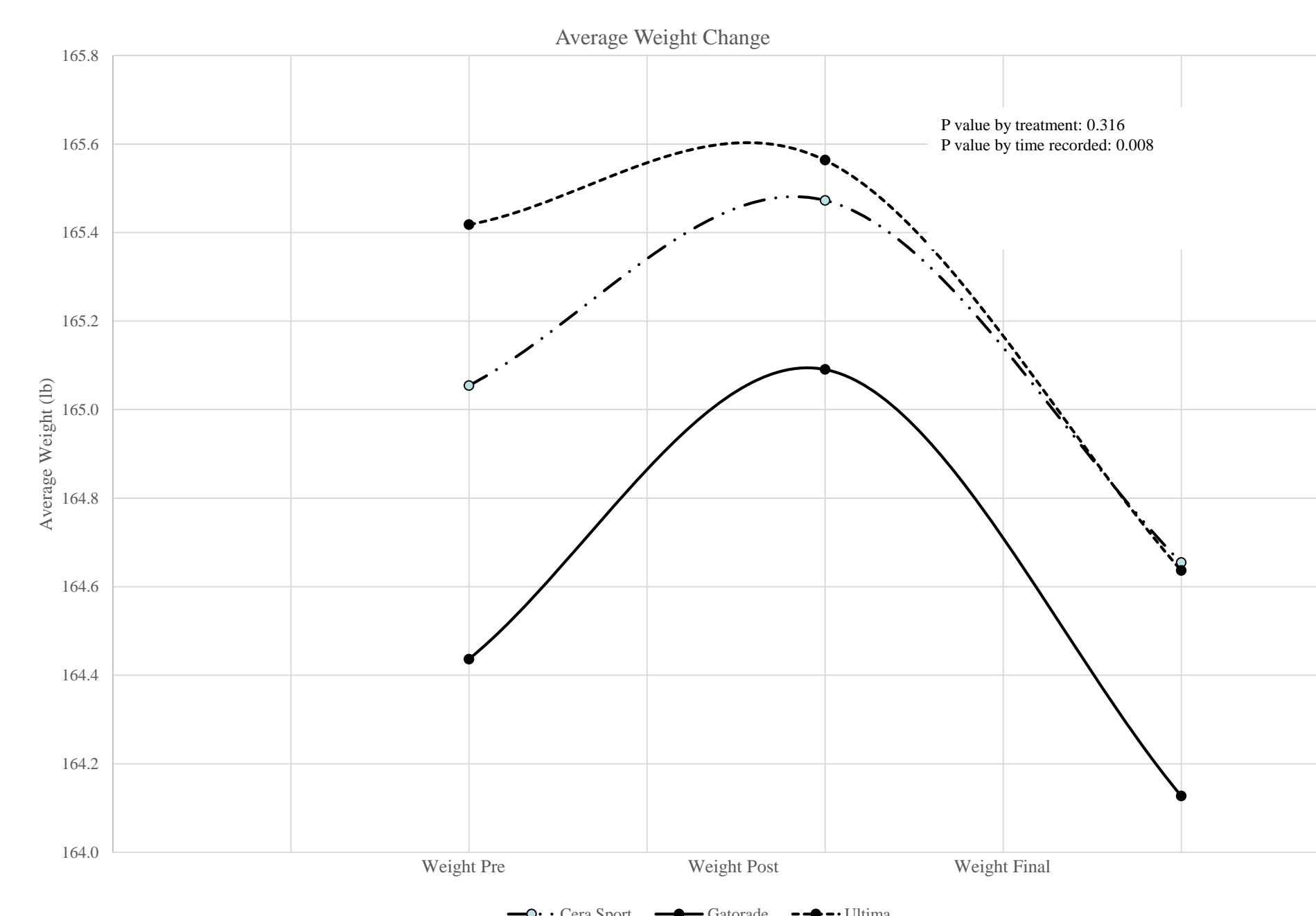
Measurement	Average CeraSport®	Average Gatorade®	Average Ultima®	P-Value
Weight Change Pre to Post (lb)	0.40 (± 0.80)	0.70 (±0.7)	0.90 (±0.7)	0.26
Weight Change Post to Final (lb)	-0.40(±0.90)	-0.30 (±1.5)	-0.80(±1.4)	0.66
Urine output (ml)	480.00 (±388.3)	204.50 (±224.9)	265.90 (±379.2)	0.26
Fluid Balance	0.84 (±0.70)	1.16 (±0.70)	0.78 (±0.90)	0.42
Temp Change (degrees Fahrenheit)	6.63 (±12.5)	1.81 (±3.15)	1.10 (±3.56)	0.12

Significant Results: WBGT Temperature and Weight Change

	Day 1	Day 2	Day 3	P-Value
WBG (degrees Fahrenheit)	76.3(±1.09)	68.4 (±1.67)	76.5(±3.21)	3.00E-05

Weight Pre to Post (lb)	Weight Post to Final (lb)	P Value
0.41 (±0.77)	-0.50 (±1.23)	0.008

Change in Body Mass



DISCUSSION

- When compared to similar studies, this project added strength and speed to the endurance component
- Data was collected en masse as a field study
- Although potentially more practical, uncontrollable psychological factors of competition between treatment groups may have effected results
- Although WBGT temperature varied from test day to test day, it never exceeded 77° F.
- The hydration paradigm prevented loss in body mass in all trials but never reached 2% associated with decreased performance
- Further studies in laboratory using controlled hyperthermic conditions may provide further insights on carbohydrate composition on performance during exercise

CONCLUSION

The present data suggest that prolonged exercise in a moderate environment has no effect on strength, speed, and endurance, when subjects are well hydrated, and under these conditions the source of carbohydrate in the sports drink does not affect performance.

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